

Appendix B
Constraints of Habitat and Channel Stability
on the Development of Drainage Improvement Alternatives
for the S-1, S-2, and S-3 Urban Planning Zones
and the N-1, N-2, N-3, N-4, and N-5 Urban Planning Zones

The studies commission for the Southeast Upper Salt Creek and the Lower Little Salt Creek Watersheds were published in a single report to reduce costs.

**CONSTRAINTS OF HABITAT AND
CHANNEL STABILITY ON THE DEVELOPMENT OF
DRAINAGE IMPROVEMENT ALTERNATIVES FOR THE
S-1 TO S-3 AND N-1 TO N-5 URBAN PLANNING ZONES**

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TABLE OF CONTENTS

	<u>Page</u>
1.0 Findings/Recommendations.....	1
2.0 Purpose/Scope.....	2
3.0 Current Catchment/Stream Conditions.....	4
4.0 Potential Changes Due to Future Development.....	8
5.0 Alternative Drainage Improvements.....	10

PHOTOGRAPHS

	<u>Page</u>
1 Stream channel immediately downstream of 40 th Street in the S-2 catchment. A riparian buffer has been preserved.....	4
2 Stream channel immediately upstream of 40 th Street in the S-2 catchment. Riparian vegetation has been removed for agricultural development.....	5
3 Drainageway in Catchment S-3 adjacent to Rokeby Road.....	6
4 Channel with head cutting or scour hole downstream of channel.....	7
5 Channel with vertical incision.....	8

APPENDIX

	<u>Page</u>
A Sampling Results.....	End of Report

1.0 FINDINGS/RECOMMENDATIONS

This report is an evaluation of the constraints of habitat and channel stability on the development of drainage improvement alternatives for the two study areas (the N- and S- watersheds) denoted in Figure 1. A summary of findings and recommendations is provided below. The findings and recommendations are based upon two site visits to the subject watersheds, the results of macro-invertebrate sampling in the N- watershed and discussions with staff from the City of Lincoln and the Lower Platte South Natural Resources District (LPSNRD). Each item listed below is discussed in more detail in the body of this report.

1. The findings of an initial site visit (including lack of water in the S- catchments and many of the N-catchment streams) and results of macro-invertebrate sampling of the subject watersheds changed the focus of this study to channel stability from its original focus on bio-assessment.
2. The type and extent of development of the subject watersheds and development schedule are currently not defined. This report is written in a general manner that would be applicable to any type of development ranging from the current agricultural development to relatively high-density commercial development.
3. There was no water in the S- channels during the September 2000 site visit. This precluded biological sampling of the stream. The channels at the upper end of the S- watershed then showed little degradation. The channels showed mild to moderate incision downstream of 40th Street.
4. Biological sampling was carried out in three locations of Little Salt Creek during the September 2000 site visit. The results of the sampling are reported in Appendix A. The channels in the N- watershed showed head cutting and bank instability, indicating that these channels are subject to significant degradation when the watershed develops.
5. The major effect of urbanization of the watersheds will come from changes in hydrology. In the absence of suitable mitigation measures, the increased flow rates and volumes,

Constraints of Habitat and Channel Stability on the Development of Drainage Improvement Alternatives for the S-1 to S-3 and N-1 to N-5 Urban Planning Zones

increased frequency of high flows, and increased base flows will cause channel instability including erosion of the channel bed and banks. This type of degradation is evident in the Beal Slough channel and other channels in the City of Lincoln.

6. Detention should be provided for all new development in the subject watersheds, either through regional or on-site storage facilities for the water quality and 2-, 10- and 100-year storm events as per City of Lincoln's criteria (section 6.4.2).
7. Channel bed stabilization is essential for the channels in both watersheds. This can be achieved through proper design of a constructed grass or wetland channel. It can also be accomplished by installing bed stabilization structures (such as concrete cut-off walls) in natural channels. Culverts can also act as bed stabilization structures if they are properly designed.
8. Wide riparian buffers around channels are valuable for preserving channel stability. The buffers should (at a minimum) conform to the City of Lincoln's criteria (section 1.5.6).
9. A stream channel assessment and monitoring program should be instituted to track streambed erosion. This will enable bed stabilization measures to be installed when needed.

2.0 PURPOSE/SCOPE

The purpose of this report is to present the results of a bio-assessment of the creeks in certain watersheds located close to the City of Lincoln, Nebraska. (See Figure 1.) This study is to be used as part of the master drainage planning effort for the subject watersheds. When used jointly with the results of hydrologic, hydraulic, engineering and cost studies of the watersheds, the results of this study can be used to develop, analyze and rank alternative channel improvement plans developed for each watershed.

Constraints of
Habitat and Channel Stability on the Development of
Drainage Improvement Alternatives for the S-1 to S-3 and N-1 to N-5 Urban Planning Zones

The original scope of this study (developed jointly by Wright Water Engineers [WWE] and Olsson Environmental Sciences [OES]) was to collect biological samples from the watersheds, analyze those samples and develop recommendations for the master drainage planning based upon the results of the sampling. The scope of the study was modified after an initial field visit to the subject watersheds on September 16 and 17, 2000 because (a) there was little or no water in most of the subject stream channels and (b) observations from the initial site visit indicated that channel stability would be a vital component of habitat in the channels. The revised scope of work, therefore, included an analysis of channel stability instead of additional biological sampling of the watersheds.

Work tasks completed as part of this study included:

1. Ryan Unterreiner of WWE and Dr. Edwin Herricks performed a site visit to the subject watersheds on September 16 and 17, 2000. The site visit included biological sampling at three sites on Little Salt Creek in the N- planning zones. It also included a meeting with John Cambridge of OES in order to scope the project.
2. Macro-invertebrates collected during the sampling were counted and identified. Standard metrics were calculated for the samples. The results of the analysis are presented in Appendix A.
3. Peter Waugh of WWE and Edwin Herricks carried out a site visit on October 27 and 28, 2000. During this site visit, a meeting was held to present preliminary results of the study to the City of Lincoln and the LPSNRD. Also, extensive field observations of the north and south watersheds were carried out to assess the condition of the stream channels in the subject watersheds. The field observations focused on the channels near road crossings because these areas were easiest to access.

Constraints of
Habitat and Channel Stability on the Development of
Drainage Improvement Alternatives for the S-1 to S-3 and N-1 to N-5 Urban Planning Zones

3.0 CURRENT CATCHMENT/STREAM CONDITIONS

The S-watershed has a mixture of low-density residential, golf course and farming development. Catchment S-1 consists of woodlands, agricultural areas and areas currently undergoing development.

Catchment S-2 consists mostly of agricultural development except for the golf course on the northern edge of the catchment. The riparian area around the channels has been preserved in some areas. This includes native trees and shrubs within a buffer zone around the drainageway. Photograph 1 shows the area immediately downstream of 40th Avenue. In other areas, grading for agricultural development has taken place up to the edge of the low-flow channel of the drainageway. There is no riparian vegetation in these areas. Photograph 2 shows the area immediately upstream of 40th Avenue.



Photograph 1. Stream channel immediately downstream of 40th Street in the S-2 catchment. A riparian buffer has been preserved.